# LIVING *on the* EDGE—
# MAINTAINING COASTAL BALANCE

O ur nation's coasts are one of our most valuable assets. Coastal areas are home to millions of residents and provide valuable economic activities from fishing to tourism. They are also under increasing pressure from population growth and development. NOAA's National Ocean Service (NOS) assists coastal managers in making sound, fact-based decisions on some very complex coastal issues, including land use and habitat restoration, by providing information (including coastal and ocean observations), products and services to the coastal management community.

Two examples of resources provided to coastal managers to address these issues include geographic information systems and remotely sensed observations and related products.

### Geographic Information Systems

Through the use of geographic information systems provided by NOS, nearly every coastal manager now has access to a wealth of information on coastal habitat changes and the effects of expanding land development. A GIS is a compilation of hardware, software, and data that enables users to produce high-quality maps, store and maintain geographically referenced information, visualize complex data, and perform analyses on data.

GIS helps streamline the process of analyzing a variety of data types and is invaluable to coastal management programs dealing with issues of habitat degradation and loss and other land-use issues. More and more coastal managers are becoming familiar with this technology and are finding its functionality very practical in their jobs.

The protection and restoration of coastal watersheds involve a vast array of complex environmental issues requiring information to be examined in many different ways. By combining scientific data and watershed characteristics in a GIS, NOAA has developed Watershed Database and Mapping Projects for several regions of the USA. These mapping and analysis tools allow information on contaminants, toxicity, natural resources, and potential habitat restoration projects to be overlaid on a watershed's features and land uses, and then displayed on maps at flexible spatial scales. This integrated approach simplifies data analysis and presentation, promotes information sharing among federal, state, and local agencies working in the watershed, and informs the public on the state of the watershed.

### Remote Sensing

The use of remotely sensed data is increasing due to recent advancements in GIS and image-processing capabilities. Remote sensing—the science of gathering information at a distance—provides a descriptive, analytical way to identify geographic features. Examples include aerial photographs, satellite imagery, acoustic data, and radar imagery. Information that previously was available only to large organizations is now suitable for most desktop computers, and is used by all branches of government and the private and nonprofit sectors.

Remote sensing is unsurpassed when it comes to obtaining data sets for a large area in a short amount of time. Remote sensing technologies are usually the most cost-effective means of getting information for areas that are

inaccessible, far away, difficult to traverse, require a broad view, or are too large to effectively manage or assess with traditional surveying methods.

NOAA's remote sensing technology helps coastal managers monitor land changes and impending water-quality issues, among other coastal management needs. Coastal managers are using this technology for shoreline mapping and erosion analysis, floodplain mapping, land cover and land-cover change mapping, habitat mapping, and coastal management permitting.

Following are examples of NOS activities that employ GIS, remote sensing, and other coastal observations to address coastal management needs.

### Mapping Coastal Land Cover

In a partnership with the U.S. Geological Survey (USGS), NOAA is producing the latest version of the National Map's national land cover database (NLCD). NOAA is creating a coastal base map to document land-cover changes in the coastal zone. State programs use this information to document land-cover conditions over a large region and to monitor land-cover changes over time. The entire coastal zone will be mapped by 2006.

### Harmful Algal Bloom Bulletins

Harmful algal blooms (HAB) and the toxins they produce are harmful to water quality, shellfish, and people. Remotely sensed data, in combination with oceanographic conditions, can help coastal managers predict the onset, intensity, and movement of a HAB. This information is distributed to coastal managers through an e-mail notification system.

### Restoration Best Management Practices

The recently released National Estuary Restoration Inventory, developed by NOAA under the Estuary Restoration Act, assists managers in the selection of approaches to habitat restoration. The Restoration Inventory contains information on techniques and monitoring data from restoration projects in coastal areas throughout the USA, allowing managers to choose techniques with the best chance of success.

### Measuring Restoration

NOAA has developed a comprehensive set of monitoring protocols for managers to use when establishing monitoring systems for restoration projects and programs. Volume 1, a framework for developing monitoring plans, was released in 2003. Volume 2, to be released this year, provides habitat-specific information for measuring the effectiveness of restoration projects.

### Examining Coastal Change

NOAA's Coastal Change Analysis Program (C-CAP) is dedicated to the development, distribution, and application of land cover and land-cover change data for the nation's coastal zone. C-CAP products assist coastal resource managers with decision-making. These national data sets are used to assess urban growth, determine changes to natural resources, and develop trend analyses.

**The National Water Level Observation Network** Coastal managers receive accurate, up-to-date tidal information through NOAA's network of tide and water-level stations. The National Water Level Observation Network (NWLON) provides real-time total water-level observations and historical water-level data for sea-level change analysis, as well as for coastal land-use and habitat-restoration planning efforts.

**Special Tools** The Coastal Observation Technology System (COTS) furthers the development of integrated coastal ocean observing systems on a regional basis. COTS is a clearinghouse for data and information collected by, and technology useful to, coastal observing systems. Using COTS, coastal resource managers can share information on techniques and methods they are employing to create a seamless flow of data, information, and products.

**Discussion Questions**

- *Have you tried to use NOS models, trends analyses, and other tools to address habitat change and/or land-use issues (e.g., benthic habitat maps, land-use and land-cover change data, watershed projects, etc.)? If so, have these resources been useful to you? How might they be improved? What other types of tools and information would be useful?*

- *How can NOS support state and local land-use decision efforts so that cumulative impacts are considered? For example, can NOS provide information or tools to enhance your ability to undertake cumulative impact assessments?*

- *How can NOS and state/local partners work together to improve the accessibility and affordability of remotely sensed data and analyses, and other information relevant to land-use and habitat- change issues? (Examples: helping states share data with each other at the regional level, improving the availability of national-level data.)*

- *Is the scale of remotely sensed and other currently available data relevant to land-use and habitat-change issues sufficient to meet state/local needs?*

- *How can NOS help ensure that coastal and ocean observations meet coastal management needs?*

- *What else can NOS do to improve your capabilities for managing the nation's coastal resources?*